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## ABSTRACT

This text is a verbatim transcription of an interview with John Bates, a former math coordinator for Metro-Toronto schools, and the Director of Inner City Education, Toronto, Canada. (The interview was conducted by Thomas C. O'Brien under the auspices of the Teachers' Center Project of Southern Illinois University at Edwardsville.) Much of the interview focuses on three math activities for elementary school students that are designed to enhance the flexibility and creativity of students while they acquire basic math skills. Math activities discussed include (1) graphic frames for learning arithmetical operations, (2) a quadrant game utilizing rule-governed allocations of symbols to different areas to develop categorization skills, and (3) rule-constrained colored block manipulation activities that involve sequential transformation from symmetrical arrangement through non-symmetrical arrangement and a return to the original symmetry. Additionally, some remarks are made about language arts activities designed to personalize, and thereby motivate, young children's involvement in reading and writing. The use of note-boxes for a student mail system and the entry of students' stories in bound book form into the school library (including reader feedback to the student author) are described. (Author/RH)

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The Teachers' Center Project  
Southern Illinois University at Edwardsville



Coaxing Children

an  
interview  
with  
John Bates  
Director of Inner City Education  
Toronto, Ontario

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This text is a verbatim transcription of an interview conducted by Thomas C. O'Brien under the auspices of the Teachers' Center Project of Southern Illinois University at Edwardsville. This transcript and others, as well as position papers, research reports and occasional papers, are available at the cost of printing from the Teachers' Center Project.

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Thomas C. O'Brien: I'm Tom O'Brien from the Teachers' Center Project of Southern Illinois University. With us is Shirley Casey from the Teachers' Center Project. And I'm pleased to introduce to you one of our favorite and one of our most frequent guests, John Bates from Toronto. John is the former math coordinator for Metro-Toronto schools. Until recently he was the principal of two of the best schools that exist in North America and he is now Director of Inner City Education for the metropolitan Toronto schools. Welcome to SIU, John.

John H. Bates: It's really good to be here again, Tom.

O'Brien: This is John's sixth or seventh visit, so perhaps many of you know of John's work. I'd like to get him talking about two aspects of schooling which seem to pervade the schools that he's in charge of. One is mathematics and the second is language. Maybe you could give some simple activities in mathematics to give people the flavor of what you've been doing.

Bates: Okay. That's a good way to start. Basically, what we have tried to do in the schools that I've been involved with in mathematics is to tap the creative aspects of kids in the area of arithmetic. I think a lot of people do a lot of great mathematics with kids. The schools that I was originally involved with were schools where the demand was very great to get the basics (whatever the basics are) in

both language and mathematics. It was extremely important to the staff and to the parents and the community that two things happen -- first of all that the kids remain creative (that was the goal of the school) and second that the basics were there.

The kinds of activities we got into were activities that forced teachers to observe where kids were. I say that word "forced" forcibly. We were not very interested in mollycoddling teachers. What we basically said is, "Your prime obligation is to set tasks for kids and give them a lot of freedom, at the same time that a lot of direction is provided, and then to observe what happens when you give them those tasks and then decide what you are going to do tomorrow. To me, that's what teaching should be all about.

*O'Brien: So the teacher is a decision maker here.*

Bates: Very definitely. The decisions are several. What will I do today? How will I set up my room so kids will want to write? What kind of intent is there for the kid in the writing he does? Where is the child's writing going? Where is his reading going? Where is his arithmetic going? Why should a child bother to learn to add 5 and 2 when he's six years old? These are questions teachers should ask themselves. If we look at the "Why do I bother" questions, you get some pretty hollow answers from education as it's traditionally been set up.

On the issue of language I'd like to give you two specific examples.

In both the schools that I was at we tried to provide lots of opportunities for kids to write to someone else. We did that in two ways. First of all we set up liaisons with other schools so that every kid had a pen pal.

Now the pen pal might only live a block away but the point was that there was a procedure where he did some writing and some drawing and he got a response from other kids. Some kids found that too difficult -- the whole regimen of having a pen pal and sending out materials. So what we did instead was begin a notebbox. (I guess that goes back to my childhood. I can remember very distinctly being bawled out repeatedly for passing notes in class. I think the only worthwhile writing I did before grade 7 was to write a little note on how someone was going to get beat up after school. That was pretty important stuff and so what we did was to legitimize it.) We said, "Hey, there are some things you want to tell people and some things you want to write to people. What we would like you to do is to have a notebbox. If you've got something to say that you don't want to say right then or if it's at a quiet time of the day and you think of it (a quiet reading time, perhaps) jot it down, put it in the box, and at the end of the day we'll open the box and deliver the notes to the children." That kind of thing worked very, very effectively. Kids were writing back and forth.

*O'Brien: The person would receive his own mail. It wouldn't be public?*

Bates: No, it wouldn't be public at all. Paul might want to say something (he might even want to say something obscene) to David. The point is that in the original classroom this was impossible. Now Paul would just scribble down a secret, if you will, and put it in the box. So the letters would go back and forth and be monitored in no way. The kids knew that the box was sealed throughout the day and that the teacher wasn't looking at the notes.

*O'Brien: Now why do this?*

Bates: To tap the intent of the kids. If you say to kids, "Write me a story about a horse," you can be relatively sure that half of the kids in urban situations haven't even seen a horse.

(I love this story: We were taking a kindergarten trip and what we were doing was what I call cowing the kids to death. We brought plastic models of cows in. We put big charts of cows on the wall. We had advertisements from the Dairy Farmer's Association. We even had kids actually make a paper maché model of a cow. Then we took 40 little kids -- little 5 and 6 year olds -- up to a dairy farm 35 miles from Toronto. There was a kid in the class named Russell. He was the kind of kid who got off the bus first, even though we told him a million times to wait until one of the teachers got off. When we arrived at the farm, Russell ran forward in the little yellow school bus and jumped down the front steps of the bus right into the face of a cow across a fence from the bus. But then he jumped back on the bus and pointed out the school bus door and said, "What the hell is that?")

Parallel to that, I think we ask kids to do all kinds of tasks in reading and writing that have no meaning but when we permit them to do some writing and reading that is going to have a consequence for them -- when they're going to see the look on the face of a person receiving the message -- then there is an intent there and the kid gets right down to the serious business of living.

*O'Brien: It's important to the child, it's initiated by the child, it has feedback or consequences that the child can see.*

Bates: That's right. Usually written feedback, by the way. If I get a note from somebody -- I'm not talking about the cursory notes that we write in institutions -- but if somebody cared enough about a speech I've made to take two lines and say, "That was great," or "That wasn't so great," then I'm aware that that person is really thinking about me. He's saying, "I lay it on the line with you. I really thing what happened there was such and such." And I'm doubly able the next time to drop a note back to him. That kind of thing is something we are losing very quickly in our society. We don't have close relationships through writing.

So that's one of the things that we tried to do. It worked very very well. Something important in that was the idea that the kid knew that his writing was to be read. That's different from what he'd been used to. Up until that time most of his writing had been marked by the teacher. (I tell a story sometimes about Jimmy Britton. I am a fan of Jimmy Britton's. He was talking to a seven-year-old one day about some writing that was going on and he said, "What a lovely, lovely story. Your teacher will enjoy reading that." The story, in fact, was about birds and a nesting situation that was seen through a classroom window. And the little kid looked up at him and he said, "Oh, my teacher doesn't read our stories. She just marks them." The teacher may well have read the story. But the kid's perception was that the teacher looks at the writing and she tells him whether it's good or bad but she doesn't think about the birds and the nest and what he's really trying to write about. So the intent has to be there in terms of the content -- the

deep structure that's involved in writing, not just the surface stuff that schools are supposed to be interested in.

*O'Brien: Let's talk about one of the most extraordinary situations I've met. In one of the schools in which you worked, K-6, they had a library of something like 15,000 books. I remember seeing that and I remember thinking, "Golly, this can't be!" Talk about that?*

Bates: We can talk all we want about the development of kids' language but there are some basic premises that have to be taken care of. First of all, kids need models. They need a broad spectrum of models. None of us brings standard English to our situation. When kids are little, schools seem to think they have to become aware of that standardization. If they are, they have to be read to often. In all of the schools that I have been associated with on a curriculum basis (either as principal or as coordinator) there has been a demand to the staff that kids hear literature -- good literature usually, sometimes classical literature -- about 40 minutes a day. Certainly the minimum is half an hour for kids from K to 6 to sit down and read stories together, to talk about those stories if they want to, and not to be questioned about those stories. The point is that children should hear the rhythm of the language and the words of the language, and get a chance to let that bounce off their souls.

*O'Brien: Not for the sake of memorizing an answer to "What color hat did John have on?"*

Bates: Not at all. I am a bit dictatorial when it comes to teachers and teacher training. I think that we should give teachers basic tools

in classrooms. That's the beginning point. Now we must help teachers become liberal in terms of their own understanding of their own groups of kids. They feel more secure and they do a better job. One thing we said to teachers is, "Hey, read to these kids for 30 minutes a day. Don't ask them a question before you turn the page -- "What do you think is going to happen next?"-- because 1) it's either predictable and so trivial that the kid feels a bit hurt by that kind of question or 2) it's so far from the kid's experience that it's an unfair question. Moreover, it's very hard to find a book that hits 30 kids directly. So we said, "Read the book, enjoy the book with the kids. And if you really get excited at the bottom of the page, say, 'Wow, isn't this story something?' and then go on. If kids suddenly burst into talking about what's going on in the book don't say shhh, but, instead, sit back for a minute, close the book (keeping your thumb in the right place, of course) and watch the kids. Watch what they're really talking about, are they talking about the story or are they talking about their experiences in relation to the story or are they talking about something completely different? Some of the kids may take the opportunity to take some relief from your story. Understand how kids hear."

Having done that, you can begin to get at certain kinds of language. In Canadian schools -- even though Sandburg is an American poet and proser, as I say -- we're very careful at the fourth or fifth grade to read a lot of Sandburg kinds of things to kids, because kids are really interested in descriptors. They are interested in talking descriptors when they're 9 and 8, and even 7. They are interested in writing

descriptors around 10 and 11 and 12, so if you give them Sandburg kind of things, they start shouting them back at you. This rarely happens immediately, by the way; it comes sometimes 18, 20, 24 months later. But it does come back. Teachers need to be selective in terms of what they're seeing the kids write and read and so a school needs to have 10, 11, 12,000 books. I'm not saying that that is a nice thing to have. I think if you're building a school, or if you're trying to redo a school, then you have to have \$50,000 to put a library in the center and you have to see that that library is full of books that teachers can read to kids and in turn kids can read to each other and to themselves. The first priority of the library has to be that.

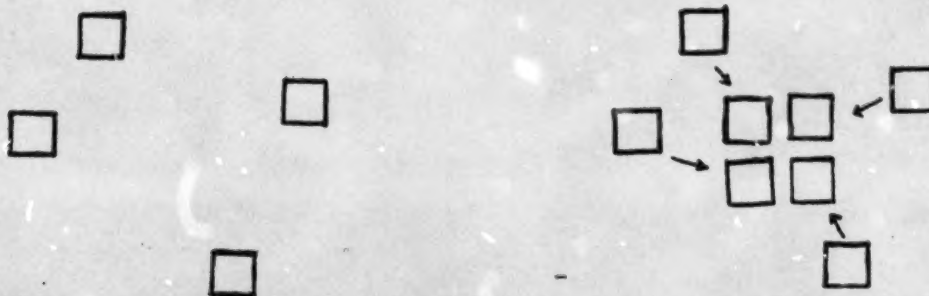
Let me carry off of that for just one second. The outshot of that kind of thing is that kids gain such respect for the library that when they're invited to add to it they do it in huge and wonderful ways. What we did at both Blake and Davenport Schools was say to the kids, "Do you want to write books and put them in the library? Do you want books of your own on our bookshelves?" The answer was, "Yes." When a kid wrote a book we were careful to provide a good binding. We used real binding tape and hard board and we tightened the book up with a staples. Then we gave him the book to decorate the cover. Once that had happened, we actually made those books part of the library, with card catalogue entry and all. The other thing that we were careful to do -- going back to the intent thing issue I mentioned earlier -- was let kids know that an adult they did not know or did not know very well, had read the book. So Miss Ernst (Miss Ernst is the kindergarten

teacher) write a short note to a grade 6 boy saying, "Dear Robert, I read your book. Ms. Smith tells me you read your book to her class (a grade 1 class). I think it's really exciting." Now Robert would carry that letter around in his pocket until it completely disintegrated. Next to his hockey cards it would be the most important thing in his pocket. Once again we're talking about intent here. We're not talking here about the content of the stuff; that always ends up being rich. We're not talking here about very specific kinds of literature. We're talking about the kid knowing that what he's doing is important.

*O'Brien: Do you want to attack the other issue, mathematics?*

*Shirley Casey: John and I were playing with a problem this morning. Maybe you would like to deal with that, and your suggestions for how it might work with kids? Can we do that right now?*

Bates: Let's just explain to folks who might see this somewhere down the line what a frame is. We watched kids in Toronto schools manipulate materials for a long time and what we began to realize is that whenever you have kids playing with blocks, what they tend to do is place blocks around like this. When you say, "What is  $2 + 1 + 1$ ," they'll take two blocks and put them in one place and one and one, and then we say, "If you put them all together, what do you have?" The kids move those blocks to a central location.



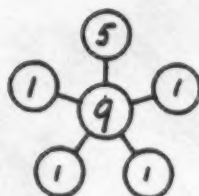
Now, if kids do that and enjoy it, instead of teaching them  $2 + 3 = 5$ , why don't we find out how would they treat  $2 + 3$  by moving symbols into a central space?



Then we took one step backwards from that, because as educators we didn't have a lot of faith in ourselves; we said, "Would kids really go after  $2 + 3$ ?" What we found out was that little kids were first of all tremendously interested in making these things that we call frames and secondly they were tremendously disinterested in  $2 + 3$ . But they were interested in continuing and were very, very happy to give us 1, 1, 1, and 1 and 1, and tell us that that was 5.

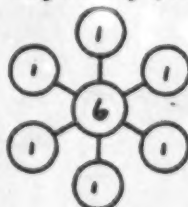


Having done that, we began to look closer at how to move kids away from the 1's and toward  $2 + 3$  and we found that one of the best ways to do that was to do a thing that I call negative closure. That was simply to say "Don't use 1's all the time." When we did that the little kids did a very exciting thing for us. What they did was to take an original number like 5, that they were interested in and then add 1 and 1 and 1 and 1 and from there they were able to develop a complete system of mathematics that showed their involvement.



The most important aspect of this is that we made some rules for teachers. Those rules were pretty straight forward. The first rule was, "We want you to teach kids the basic process, a frame." Having done that, then let them show you what they can do with it. Having received on paper something that has happened, look at the paper closely and decide what they've done best and instead of trying to teach them something, have them learn something by taking their best thing away from them." Now that seems cruel, and it probably is cruel for 2 or 3 minutes for the kids. In the long run what happens is the kid takes up the challenge.

*O'Brien: So he's been making beginning frames, 1, 1, 1, 1.*



Bates: That's it, 1, 1, 1, 1. And you see that this kid is most secure using 1's, so what I want to do is take the edge of his security. All I'm saying is, "You can't use 1's all the time." So he's still going to use 1's 90 per cent of the time when most of the other kids use 1's every time. But it gives you something else to bite on. Then you can go to the next small step which says, "Don't use 1 at any time." At that point he begins to show you what he really knows about arith-

metic.

We did something similar with grade 4 kids and grade 5 kids. Without frames, we said, "Write us 10 number sentences, any 10 number sentences." They invariably wrote number sentences for numbers between 10 and 30 and they used just two numbers, e.g.  $25 + 5 = 30$ . So we immediately had two things we could do with those kids. One was to ask them to make their number sentences smaller than 10 or larger than 30. The other thing was get them away from the two-number syndrome we've gone through for 60 years in North America. Can you write a mathematical sentence with 3 members or 4 members?" And some of the kids would say, "Oh, yes, of course I can." And they'd do that and they'd gain a little bit of confidence about their mastery of number. Instead of seeing the number as controlling them, they suddenly said, "Hey, I can push these numbers around any way I want." If we wanted to get at something a little bit convergent, for instance two digit from two digit subtraction, we would simply list 50 two digit numbers and say, "Okay, pick out any pairs of these you want and subtract one from the other." What we found kids doing was selecting at the level they could work best. If they couldn't carry or borrow, they would make sure that the second digit in the larger number was larger than the other digit. That selection — their selection — gave them control over us and over the number, instead of us and the numbers having control over them.

*O'Brien: Once they get to be very good at that then you ...*

*Bates: Just tighten it up. Just keep gradually tightening it up and saying, okay ...*

*O'Brien: Take another step, kid.*

Bates: That's right. You go back to that same sampling of 50 numbers, for example, and say, "Okay, you've been playing this game with me. Now what I want you to do is subtract these numbers and the units digit always has to be the same. So you take 39 and subtract it from 49. Then you go that one step further to say, "Okay, look at your answers, they all end in 0, talk about that a bit." The next step, of course, is to get them into units digit of the small number being larger than the unit digit of the larger number.

*O'Brien: The frame thing lends itself nicely to subtraction as well.*

Bates: Yes, it's great.

*O'Brien: Could you talk a little bit further the frame thing? It can be done with very young children, but it can go quite a long way into multiplication and division.*

Bates: No problem at all. Can I take a second to show that? When we wanted to get into subtraction, we said to the kids, "I'll do you a favor today. You've been starting with centers and putting your own arms.



Instead of just giving you a center, we'll give you a center and an arm. The center has 39 in it and the arm has 27. All you have to do is fill in the other arm."

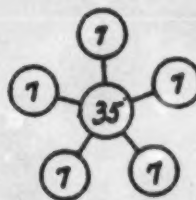
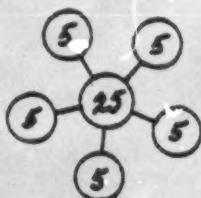


There were two kinds of responses. First of all, there was immediate joy followed by, "Oh, we've been tricked." But what happened there was pretty straightforward; kids began to learn that 39 take away 27, that's 12. Those kids who weren't quite ready for that didn't stick closely to our format. What they did was to say, "Okay, 39 and 27, 10 more gives me 37, I still don't have enough. I'll just add some 1's."



So they had the experience of saying, "I still control this situation." We could let them play with it that way for a while and then we'd say, "You can't use any 1's. You have to stay with the arms you are given." But it was coaxing rather than duress.

With multiplication, we had a lot of fun. We said to the kids, "The rule is that for every frame you make the number in every arm must equal the number in every other arm."



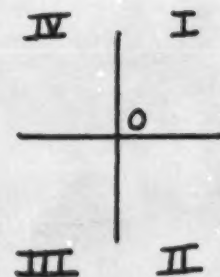
So some kids would put 5 in every arm and get 25 in the center. Others would put 7 in every arm and get 35. At the end of 10 minutes we'd say, "Let's list all the numbers that we've got." So Jimmy and Ray and Joan and everybody else in the room would list all the numbers and we'd say, "How are all these numbers the same? How are they different? Let's go to the counting board and see what they are." And suddenly the kids would have the 5 times table. Then we'd say, "Okay, let's do another table tomorrow. How would you find the 7 times table?" And the kids would say, "7 arms, you know." And away we'd go.

*Casey: Yes, I'd like to expand on this a little bit because I think that the quadrant stuff that you've done is related to this.*

Bates: Oh, yes, very definitely. Let's take a look at what the quadrant stuff is. We can play a little game. I'll give Shirley and Tom the same directions I would give a group of kids. This is a group of kids that has been at this for a while. They're sophisticated kids, as I'm trusting that Shirley and Tom will be. What I'm going to do is draw a quadranted area on the board and call the quadrants I, II, III, and IV. What I'm going to say Tom and Shirley, is, "I'd like you to guess any number between 1 and 100 and the first five numbers you guess, I'll put in the quadrants. After that you're going to have to guess a number for me and also tell me what quadrant you think it goes in. Tom, do you want to set us off?

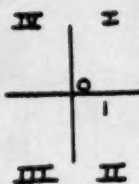
*O'Brien: Zero.*

Bates: Zero. It goes right here.



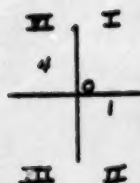
Casey: One.

Bates: That goes right here.



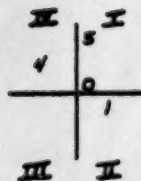
O'Brien: Four.

Bates: Four goes up here.



Casey: Five.

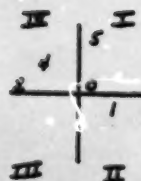
Bates: Five goes here.



Casey: We only have one more number.

Bates: Make it good, huh?

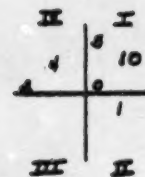
O'Brien: Let's go back to do two.



Bates: Okay, two goes here. From here on you are on your own, you have to give me numbers and tell me where they go.

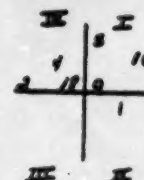
Casey: Okay, I guess that 10 goes in Quadrant I.

Bates: You're right.



O'Brien: And I guess that 18 goes in Quadrant IV.

Bates: You're right.



Casey: May I ask a question?

Bates: Sure.

Casey: Is it possible that 18 could go in another quadrant as well?

Bates: Not this time.

Casey: Okay.

Bates: Sometimes you can play the game so the number can go in two different quadrants. This isn't one of those times. This time, because we're at the early stages of the game, I'm making sure that each group is dissimilar.

O'Brien: 25 goes in Quadrant I.

Bates: Yes. At this point, and with this bright group, we could probably make a rule for Quadrant I and get rid of all these numbers.

O'Brien: *Multiples of 5.*

Bates: Fine, right, so they're all gone.

Casey: *I guess that Quadrant IV is multiples of 2.*

Bates: Okay, but because you're a fairly wise group we haven't necessarily stayed with multiples all the time. So there's a double rule here. I'll just give you the little hint that the rule has nothing to do with multiples here.

Casey: *Okay. I can assume that up to this point if a number belonged in more than one quadrant it would have been put there.*

Bates: That's right.

Casey: *So that there's no possibility that II would be odd numbers, because 5 would've gone down there as well.*

Bates: That's right.

Casey: *Okay.*

O'Brien: *So a double rule for IV could be multiples of 2 but not 5.*

Bates: Multiples of 2 but not those numbers that are multiples of 5. Yes, that's a compound rule. This but not that.

O'Brien: *Which is pretty complex.*

Bates: It's complex but amazingly the kids are there much faster than we are.

O'Brien: *Let's go ahead to II and III.*

Bates: Okay, so we know these are multiples of 2. We've taken care of all the even numbers. And we've taken care of all the multiples of 5.

Casey: *Okay, let's put 3 someplace.*

Bates: That's a good idea. Where would you put it?

Casey: Let's see whether it goes into III.

Bates: III? It does go in number III.

O'Brien: I'll just shoot and say 6 goes there as well.

Bates: No, 6 goes up here.

O'Brien: Oh, of course, does not 6 also go in III?

Bates: No.

Casey: Does 9 go in III?

Bates: Um, humm.

Casey: Is that maybe a double rule as well?

Bates: Yes. It's a double rule when adults play the game. I think it's a single rule when kids play the game. I'll explain that when we get the end.

Casey: What I'm thinking is that that may be multiples of 3 that are not also multiples of 2. Because that would explain why 6 didn't go into it.

Bates: I just help you out and tell you that 7 goes there too.

O'Brien: So does 11 go there?

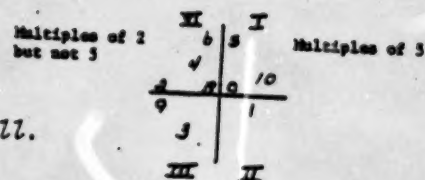
Bates: No, 11 goes over here. Now you should be able to tell me where 41 goes.

Casey: I guess it goes in II.

Bates: That's right.

O'Brien: So everything that ends in 1 goes into II?

Bates: That's right. 91, and 81, and 71 all go in II. We've done quite a bit of thinking as kids here, haven't we? We have all the numbers that end in 1 and we could talk about the unit's place in terms of place value. Up here (1) we have multiples of 5. Over here (2) we've got an exclusion and down here (3) we've got what kids call garbage.



|                             |    |     |    |    |                        |
|-----------------------------|----|-----|----|----|------------------------|
|                             |    | II  | I  |    |                        |
| Multiples of 2<br>but not 5 | 10 | 6   | 5  | 10 | Multiples of 5         |
|                             | 4  |     |    | 25 |                        |
| Garbage Dump                | 8  | 12  | 0  |    | Numbers ending<br>in 1 |
|                             | 9  | 7   | 11 | 14 |                        |
|                             |    | 3   | 14 | 11 |                        |
|                             |    | III | II |    |                        |

They say that that's the garbage dump. Now the value of the garbage dump is that after you collect it you say to kids, "Let's make a rule for the next game that makes the garbage dump a significant identification." And it comes up to Quadrant I. It could be called all the odd numbers that don't end in 1 or 5. The kids now have basically a triple logic sequence going for them -- the number has to be odd, and it can't end in 1 and it can't end in 5. It's hard to find more than three categories.

If you were just working with grade 3 kids and doing multiplication, the thing to do would be to take four different multiplication sequences and do the thing that Shirley suggested, that is, 15 would go into 2 places, the multiples of 3 and the multiples of 5.

*O'Brien: So, all at once this involves some arithmetic, it involves multi-classification, it involves hypothesis testing.*

Bates: And the thing is that if you do that for three minutes every day (not necessarily at the front end of the mathematics class, by the way), you very quickly find kids doing some interesting things. If you're observing the kids, you'll see that everybody in your class is ready to be in the first five or seven. They want to make things easy for themselves. They say, "Hey, if I give you an answer now, I won't have to name the quadrant." Then they'll usually get to the point where they want to be the quadrant predictors. And then they want to be the articulators who say, "I know the rule." If you're at all sensitive, you'll begin to see those three groups of people in terms of hands raised. And you feel success as a teacher because after eight

or nine days you'll find that every kid in the class is at least attempting the articulation -- trying to name the rule. And they don't give up when you tell them that that isn't what you were thinking because they know it's a darn hard task, and they say, "Well, it's okay to be wrong with that hard a task."

Now Shirley said that this is related to the frames. I have to tell you that you're the first person that I've talked to in 12 years who has said that. You're right. The relation is the spatial thing -- the idea that frames deal with two dimensions and this quadrant thing once again allows the kid to spread over space and doesn't organize his thinking in a linear manner but lets him sort of play with space in his own way. What you do find is that kids sometimes concentrate, just looking at Quadrant I and trying to guess what else goes there without paying any attention to anything else. Then you have the random seekers who are just all over the place. They're two ends of the spectrum. At one end there are the guessers and at the other end are the people that I call the articulators.

*Casey: It's not necessary, from my experience, to play this only with numbers, nor is it necessary to play it in math.*

Bates: No, no. Words. Words with double letters are one kid's love, you know. Yellow goes in this quadrant, what other words do? And then they get going on all the double consonant kinds of words and fire them in there. Or words that begin with a particular letter. Words that end with a particular letter. Or people and their occupations. Or animals. Yesterday, I noticed that a teacher in East St. Louis gave me a chart

that her kids were going to fill out when they went to the zoo. It had the color of the animal, whether it was furbearing, how many legs it had, bang, bang, bang. Imagine if those kids had that chart in front of them and she did the quadrant game. Imagine them looking down on their charts, finding the evidence that they had picked up at the zoo and figuring out that the beaver and the octopus were in the same category. Why could that possibly be? One of the charts was, "Where They Live," The kids see the beaver in the water and the octopus in the water and they begin to say, "These are animals that belong in one sense in the same category." I think that that is the thing you were talking about, Shirley, allowing and encouraging categorization. Here you have a categorization game that can be used with anybody. It's a problem solving kind of thing.

We've spent a lot of time on some issues here but they are important issues. One more thing: the interesting thing about little kids is that when they sort, they're not afraid to have a garbage category. The interesting thing about the world's top scientists is that when they sort they're not afraid to have a garbage category. And the interesting thing about many of the people over eight who have not graduated with their doctorate from MIT is that they are not willing to have a garbage category when they sort. (You have both done workshops where you ask ladies to empty their purses on the table and categorize all the things. Ladies, in fact, try. Men do too, by the way. If they can't get everything into the leather, the plastic and the paper category they say, "I've got a whole lot of stuff left over that doesn't fit." What little kids and scientists do is say, "Hey, isn't that the group we want to talk about?"

and they put the other stuff aside, because they know too much about it already. What they say is, "Let's look at the stuff that we can't categorize and see if there's some way we can sort it out. Somehow our kids lose that. I'm not blaming the system. I'm not blaming anything. I think that it's probably a developmental thing and they develop away from it. The point is that we can keep it as part of development by encouraging sophisticated categorization. You have to get past the surface structure into the deep structure so that the kid begins to say, "There's more to this part of my life than I bothered to look at." That makes him a much more discerning human being.

*O'Brien: Want to talk about the cube problems?*

*Casey: I still don't want to talk about the cubes. I think that this serves to do at least one other thing. Tom talks about the natural atomism of children and what the traditional curriculum tends to do with respect to making that atomism permanent and setting it in bronze. We often act as though spelling has nothing to do with English which has nothing to do with math. I think that the John Bates view helps kids see their academic world as interrelated rather than compartmentalized. There are certain thinking skills that are valuable no matter what it is you're trying to do. I think there are a lot of teachers who don't see that.*

*Bates: One of the things I get from university folks in Canada, particularly the history people and the science people — and I get it from the high school people too, the specialists, as I call them — is that kids can't write; they're not getting much out of what they're doing*

because they can't write well. It seems to me that most complete and utter foolishness to carry on recognizing that people aren't getting the most of their education because they can't do something else. The historian and the scientist at the university who say, "My pupils aren't getting what they should be getting because they can't write," are acting in an immoral fashion. They need to stop historizing and scientizing, and say, "Look, we're now going to do something simple in science (or something simple in history) today but we're going to write it up well." For a time he should concede the content area and act on behalf of kids. Language and thinking are the binding agents that bring all this stuff together.

In elementary schools, language gets a major part of the day. But when the language part of the day is over, the language part of the day is over. Kids in classrooms may write a creative story in the morning, but if it's afternoon and we're doing something expository with history or math or science, it's the teacher who does the writing.

*Casey: But language was not and often is not seen as part of communication.*

*Bates: That's right.*

*Casey: It was seen as something with a set of rules for children to work with.*

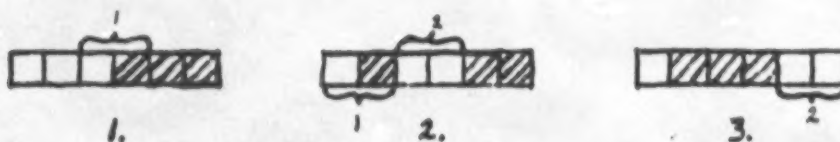
*O'Brien: I have a suggestion to make to those people who are in touch with what we're doing right now. I suggest that they just take time off and do some activities with one another. Don't be satisfied with just watching our having done it. Try the quadrant activity with the hypothesis testing, for example, with numbers or with words or with animals. It*

*seems to me that a lot of these issues get much richer when you do them and immerse yourself in them, rather than just listen to our talking about them.*

Bates: That's right.

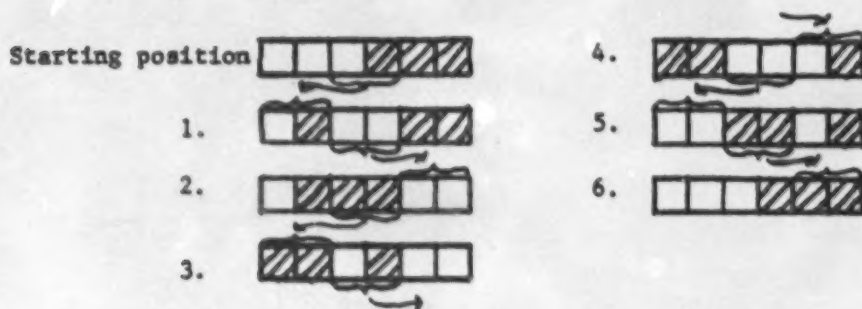
O'Brien: *Let's do the cubes. Our time is going. Then I'm going to ask you to suggest some future references which people might read for follow-up.*

Bates: Okay. What I've done here is set out six blocks. Shirley showed me this task this morning and I think it's a pretty exciting task. Three of the blocks are green and three of them are yellow. The challenge of the task is very, very straightforward. What you have to do is take the two center blocks at any time and move them to what I call the pigtail end. By pigtail end I simply mean the end that you haven't moved to before, so if the first center pair goes left, then the second center pair must go to the right.

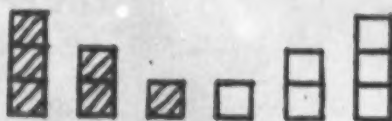


The task, basically, is to get the arrangement back to the way it was before. In this arrangement the yellow cubes are on your right and the green cubes are on your left. My job is, by making those moves to get things back to their original state. And what I'd like to do is to do that whole sequence and then talk about things that kids might do when they're looking at the sequence. It isn't just a game task. There are

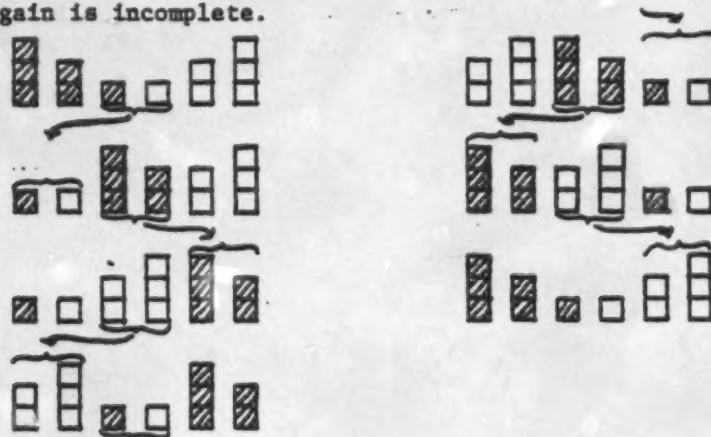
a lot of things happening here that, I think, should be looked at. First of all, moving two to the left, I get this kind of arrangement (1), then in moving two to the right, I get this (2) with the three green actually moving toward the center. Move one more time, and then one more, then one more, then one more, then I'm back in six moves to the original configuration.



On the surface, kids could do that kind of thing and just count the moves and see how long it took. You get some nice patterns if you do it with three of each color. Then four of each color, then five of each color, and so forth. But internally, interesting things begin to happen. Let me change this configuration just to show you some of the things that kids might want to talk about. What I'm doing now is to give a different height to each of the modules in the task. The end pieces are three high, the center pieces are one high and the in-between pieces are two high, so that what we have, looking from the front is a symmetrical, inverted arch.



Now when you move the two single cubes to the left, there's a partial symmetry, the symmetry is no longer complete, so you move the new centerpiece to the right, the partial symmetry inverts itself, but the symmetry once again is incomplete.



However, on the third move you get back to full symmetry, on the fourth move you lose it, on the fifth move it's still lost and on the sixth move you get it back again. If you give symmetrical arrangement to one and a non-symmetrical arrangement zero, you'd have 1, 0, 0, 1, 0, 0, 1. And if you did it with four blocks you'd get 1, 0, 0, 0, 1, 1, 0, 0, 1, 1, 0, 0, 1. That kind of modulation is taking place all the time in this arrangement, so that a kid doing the task at around grade 5 might be interested in this. A younger kid, drawing a picture each time would be much more interested in how the colors varied. And older kids would be much more interested in how the patterns developed internally. This is a task, by the way, that appears simple at the outset but it could probably be used with any child from the age of 4 (with an adult working with him) to children 5, 6, and 7 (working alone or working in pairs after the age of 7) right on through old age. A grade

7 task, for example, would be to predict how many times you would have to move if you had 10 of each color. Try it out with 3, 4, 5 and get your prediction, then try it out with 10. You'd have to have a long time, I think, if you did it with 18. In grade 6, suppose you wanted to teach what a million was. (I remember people in St. Louis collecting a million bottle caps once.) This task, if it were done with 18 pieces for each color would probably take 23 people a lifetime. Kids would be fascinated by that.

*O'Brien: But then for high school kids you could generate some sort of computer program to model this.*

*Bates: Sure.*

*O'Brien: We're running into time problems. Let me ask you, John, what should people be reading to extend the ideas that you are talking about? Let me start by taking you off the spot. Your Addison Wesley stuff is delicious. The title is Developmental Math, Addison Wesley, Canada. And the Addison Wesley people in the US have it available but you have to ask about it. What other things?*

*Bates: Well, in terms of the language issues, there is an excellent article by James Britton in the keynote article in the January issue of National Council of Teachers of English. It's probably the most sophisticated and most consolidated piece on language that I have ever seen. And I think that as a beginning point that's probably the most important article to read. On math, you should know about the simple guide book to a thing called Math Patrol.*

*O'Brien: Math Patrol? Produced by?*

Bates: Produced by TV Ontario, Ontario's educational television channel. It's a series of 50 television shows for kids. All we do is throw 10 challenges into a classroom and say to the kids, "You could be doing these things with materials." Then the kids, we hope, bug their teacher and get the materials in the classroom.

O'Brien: How about Freedom to Learn by Jim MacLean and Edith Biggs?

Bates: That's excellent and I know that your library also has another book by Jim MacLean. Jim is not allowed to be recognized as the author because it's a government publication but I'm certainly not afraid to say that he was primarily responsible for the Ontario books Living in Primary and Junior Divisions. I hate to sort of expound on Ontario material, but I'm not really saying so much about the Province as about Jim MacLean himself. He is behind most of the writing of any of the Provincial guideline books. You probably have all of them in your library. If not, let me know. I'll make sure that they are sent on to you because I think that Jim MacLean is a superb observer of what can happen to little kids and that he is the one government official whom I've known anywhere in the world who isn't afraid to lay it on the line.

O'Brien: And act on behalf of kids.

Bates: That's right.

O'Brien: As you are doing so richly. How would people get in touch with you, John, if they wanted to?

Bates: Well, I'm Coordinator of Programs for the Toronto Board of Education. All you have to do is to write to John Bates, Toronto Board of Education,

and believe it or not, it gets to me.

*O'Brien: Let's thank John so much for sharing his ideas with us. I think the title that I would use for your session here, John, is Coaxing. That's a lovely word to use. Thanks awfully much for joining us.*

*Bates: Thank you Tom. I enjoyed it.*